WHAT IS CLAIMED IS:

1. A purified or isolated nucleic acid comprising a sequence that encodes a peptide loop corresponding to amino acid residues 136-216 of wild-type IRP-2 from humans, wherein said sequence comprises a mutation in said peptide loop, wherein said mutation interferes with the ability of a cysteine residue present in said peptide loop to undergo oxidation.

2. The purified or isolated nucleic acid of Claim 1, wherein said nucleic acid sequence comprises at least one of **SEQ. ID Nos. 3, 5, 7, 9, 11, 13, and 15.**

3. The purified or isolated nucleic acid of Claim 1, wherein said nucleic acid sequence encodes a peptide comprising a sequence selected from the group consisting of **SEQ. ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

4. A purified or isolated polypeptide comprising a peptide loop corresponding to amino acid residues 136-216 of wild-type IRP-2 from humans, wherein said sequence comprises a mutation in said peptide loop, wherein said mutation interferes with the ability of a cysteine residue present in said peptide loop to undergo oxidation.

5. The purified or isolated polypeptide of Claim 4, wherein said IRP-2 protein comprises a sequence selected from the group consisting of **SEQ ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

6. The purified or isolated polypeptide of Claim 4, wherein said IRP-2 protein is selected from the group consisting of **SEQ. ID. Nos. SEQ ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

7. A method of identifying a subject in need of treatment or prevention of a neurodegenerative disease comprising:

obtaining a biological sample from said subject having polynucleotides or protein;

providing a probe, said probe being selected from the group consisting of a probe that interacts with a wild type or mutant IRP-2 protein and a probe that interacts with a polynucleotide encoding a wild type or mutant IRP-2 protein;

contacting the biological sample with the probe under conditions that allow the probe to interact with the polynucleotide or protein in the biological sample;

detecting the amount of probe that interacts with the polynucleotide or protein in the biological sample; and

identifying the subject as a subject in need of treatment or prevention of neurodegenerative disease by determining the presence or absence of the probe with the polynucleotide or protein in the biological sample.

8. The method of Claim 7, wherein the probe is selected from the group consisting of a nucleic acid, a protein, and a peptidomimetic.

9. The method of Claim 7, wherein the detection of the amount of probe that interacts with the polynucleotide or protein comprises use of a technique selected from the group consisting of fluorescence-activated cell sorting (FACs), immunoprecipitation, Western blot, immunochromatography, antibody staining, and a hybridization assay.

10. The method of Claim 7, wherein the neurodegenerative disease is Alzheimer's disease.

11. A method of making a probe for the diagnosis of a neurodegenerative disease comprising:

providing a polypeptide according to Claim 4; and

generating an antibody that binds to an epitope present on said mutant polypeptide, wherein said antibody does not cross react with a wild-type IRP-2 protein or fragment thereof.

12. The method of Claim 11, wherein said mutant comprises a substitution or a deletion of a cysteine residue.

13. The method of Claim 11, wherein the generating step comprises culturing cells which produce said antibody.

14. An antibody capable of specifically binding to a protein comprising an amino acid sequence selected from the group consisting of **SEQ ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

15 The antibody of Claim 13, wherein said antibody specifically binds to a polypeptide comprising at least 10 consecutive amino acids of said protein and said protein has a mutation of a cysteine residue.

16 The antibody of Claim 13, wherein the antibody is a monoclonal antibody.

17. A purified or isolated antibody capable of specifically binding a mutant IRP-2 protein but does not specifically bind wild-type IRP-2 protein, wherein said mutant IRP-2 protein comprises a mutation in a peptide loop that corresponds to the amino acid sequence of **SEQ. ID. No. 2.**

18. The method of Claim 7, wherein the identification of the subject as a subject in need of treatment or prevention of neurodegenerative disease comprises determining whether the probe interacts with the polynucleotide or protein in the biological sample.

19. A method of differentiating mild cognitive impairment syndrome (MCI) from other forms of dementia in a human patient, comprising:

conducting magnetic resonance imaging (MRI) on the patient to quantitate and/or monitor brain iron;

wherein abnormal levels or distribution of brain iron indicate the presence of MCI.